



# The GoLand Blog

A Clever IDE to Go

menu ▼

# How to Use go:embed in Go 1.16



Florin Păţan

June 9, 2021

One of the most anticipated features of Go 1.16 is

the support for embedding files and folders into the application binary at compile-time without using an external tool. This feature is also known as `go:embed`, and it gets its name from the compiler directive that makes this functionality possible: `//go:embed`.

With it, you can embed all web assets required to make a frontend application work. The build pipeline will simplify since the embedding step does not require any additional tooling to get all static

files needed in the binary. At the same time, the deployment pipeline is predictable since you don't need to worry about deploying the static files and the problems that come with that, such as: making sure the relative paths are what the binary expects, the working directory is the correct one, the application has the proper permissions to read the files, etc. You just deploy the application binary and start it, and everything else works.

Let's see how we can use this feature to our

advantage with an example webserver:

- First, create a new Go modules project in GoLand, and make sure you use Go 1.16 or newer. The go directive in the go.mod file must be set to Go 1.16 or higher too.

```
module goembed.demo
```

```
go 1.16
```

- Our main.go file should look like this:

```
package main
```

```
import (  
    "embed"  
    "html/template"  
    "log"  
    "net/http"  
)
```

```
var (  
    //go:embed resources  
    res embed.FS
```

```
    pages = map[string]string{
        "/": "resources/index.gohtml",
    }
)

func main() {
    http.HandleFunc("/", func(w http.ResponseWriter, r *http.Request) {
        page, ok := pages[r.URL.Path]
        if !ok {
            w.WriteHeader(http.StatusNotFound)
            return
        }
        tpl, err := template.ParseFS(resources, "resources/"+page)
        if err != nil {
            w.WriteHeader(http.StatusInternalServerError)
            return
        }
        err = tpl.Execute(w, nil)
        if err != nil {
            w.WriteHeader(http.StatusInternalServerError)
            return
        }
    })
}
```

```
if err != nil {  
    log.Printf("page %s not found", r.URL.Path)  
    w.WriteHeader(http.StatusNotFound)  
    return  
}
```

```
w.Header().Set("Content-Type", "text/html")  
w.WriteHeader(http.StatusOK)  
data := map[string]interface{}{  
    "userAgent": r.UserAgent(),  
}  
if err := tpl.Execute(w, data); err != nil {  
    return  
}
```



```
    }  
  })  
  
  http.FileServer(http.FS(res))  
  
  log.Println("server started...")  
  err := http.ListenAndServe(":8088",  
  if err != nil {  
      panic(err)  
  }  
}
```

- Next, create a new resources/index.gohtml file like the one below:

```
<html lang="en">
<head>
  <meta charset="UTF-8"/>
  <title>go:embed demo</title>
</head>
<body>
<div>
  <h1>Hello, {{ .userAgent }}!</h1>
  <p>If you see this, then go:embed v
</div>
```

```
</body>  
</html>
```

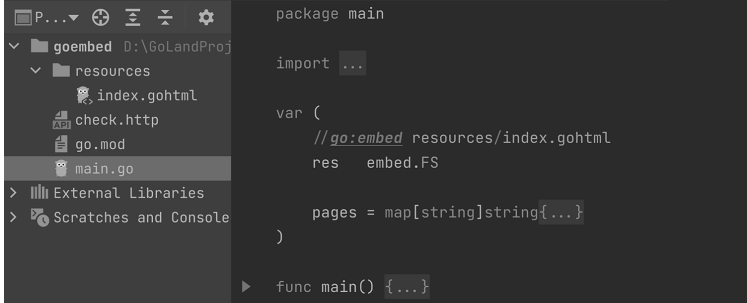
- Finally, create a file called `check.http` at the root of the project. This will reduce the time it takes to test our code by making repeatable requests from GoLand rather than using the browser.

```
GET http://localhost:8088/
```

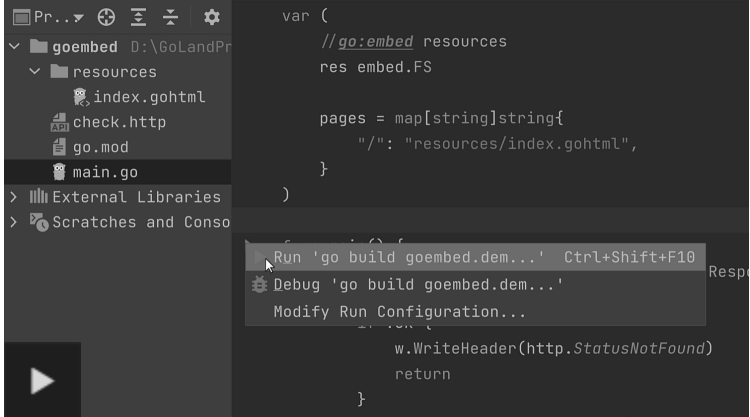
**Note:** If you need to, you can download a newer

version of Go using GoLand either while creating the project or via Settings/Preferences | Go | GOROOT | + | Download ...

This is how the project layout should look:



If we run this project, then test the request from the check.http file against our server, we get what we'd expect: an HTML response that contains our Hello message and the "Apache-HttpClient" user agent.



At first, this might not look different than any other

server responding to a request with our template code.

However, if we change the code in the template without restarting the server, we'll quickly notice that our output will not change unless we rebuild the binary. We can even remove the template, move the binary, or change its running directory, and the result will be similar. How does this work, then?

## A quick look at how go:embed works

We can isolate a few parts of our code that are involved in using this feature.

We'll start with the imports section, where we can see that we are using a new package called embed. This package, combined with the comment `//go:embed`, a `compiler directive`, tells the compiler that we intend to embed files or folders in the resulting binary.



You need to follow this directive with a variable declaration to serve as the container for the embedded contents. The type of the variable can be a string, a slice of bytes, or `embed.FS` type. If you embed resources using the `embed.FS` type, they also get the benefit of being read-only and goroutine-safe.

## GoLand support for `go:embed`

GoLand completion features come in handy while

using the embed directive, helping you write the paths/pattern.

```
package main
```

```
import ...
```

```
var (
```

```
    // go:embed resources/|
```

```
    index.gohtml
```

Ctrl+Down and Ctrl+Up will move caret down and up in the editor Next Tip

```
    pages = map[string]string{  
        "/": "resources/index.gohtml",  
    }
```

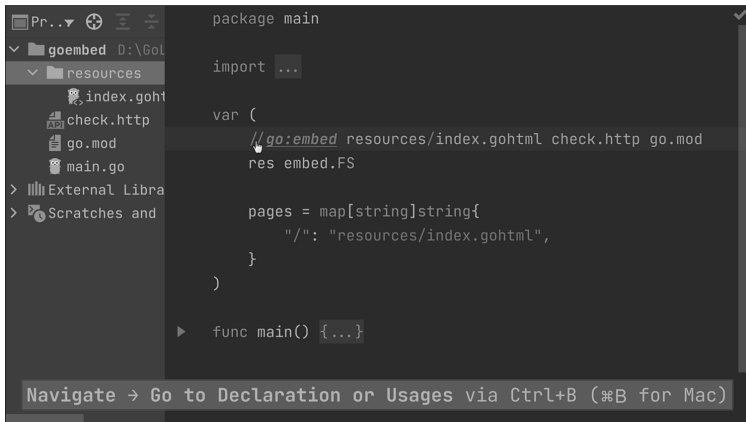
```
)
```

```
func main() {
```

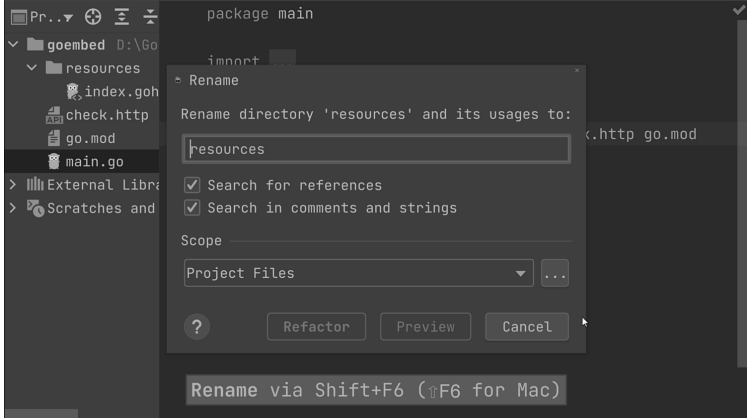
```
    http.HandleFunc(pattern: "/", func(w http.ResponseWriter, r *http.Request)  
        page, ok := pages[r.URL.Path]  
        if !ok {
```

You can also navigate to the embedded resource

from the editor.



What if you want to change the name of the resource you've embedded? Or perhaps you want to change the whole directory structure? GoLand has you covered here too:



**Pro tip:** You can embed resources into the binary from any file, not just the main one. This means that

you can ship modules with resources that are transparently compiled into the end application.

**Pro tip:** You can use the embedding feature in test files too! Try it out and let us know what you think.

## Limitations

Embedding empty folders is not supported. Also, it's not possible to embed files or folders that start with “.” or “\_”. This will be addressed in an upcoming version of Go, thanks to this related

issue. Embedding symlinks is not currently supported either.

If you don't plan to use `embed.FS`, then you can use `//go:embed` to embed a single file. To do so, you must still import the `embed` package, but only for side effects.



```
package main
```

```
import (  
    "html/template"  
    "log"  
    "net/http"  
)
```

```
var (  
    !
```

```
//go:embed resources/index.gohtml
```

```
res string
```

```
pages =
```

```
)
```

```
func main() {
```

Go file with go:embed must import "embed" package

Import "embed" Alt+Shift+Enter More actions... Alt+Enter

Package: main

var res string

...

The embedding directive must not contain a space between the comment and "go:".

```
// go:embed resources/index.gohtml  
var res string  
  
//go:embed resources/index.gohtml  
var res string
```

The embedded paths must exist and match the pattern. Otherwise, the compiler will abort with an error.

```
//go:embed resources/index.html
var res string

func main() {...}
```

Unresolved path

Run: go build goembed.demo

<3 go setup calls>

main.go:14:12: pattern resources/index.html: no matching files found

Compilation finished with exit code 1

## Conclusion [↗](#)

That's it for now! We learned why and how to use Go 1.16's new embedding feature, took a look at how it works, and considered some caveats to

remember when using it. We've also seen how GoLand helps you work with this feature and provides features such as completion, error detection, and more.

We are looking forward to hearing from you about how you use this feature. You can leave us a note in the comments section below, on Twitter, on the Gophers Slack, or our issue tracker if you'd like to let us know about additional features you'd like to see related to this or other Go functionality.

go 1.16

go:embed

Share



---

← GoLand 2021.2 EAP Build #2 Is Here!

→ GoLand 2021.1.3 Is Here

Discover more

June 11, 2021

## How to increment the major version of a go module using GoLand

Let's look at the workflow of incrementing the major version of a module using the module definition taken from our Wh...



Florin Păţan

May 5, 2021

## Compile and run Go code using WSL 2 and GoLand

Today, I'm happy to introduce our latest feature to you to use Windows Subsystem for Linux version 2 (WSL 2, or

simply...



Florin Păţan

April 30, 2021

## How to use Docker to compile and run Go code from GoLand

Up until now, when you wanted to test or run your shiny new code, you had only the local machine to do so. Many of ou...



Florin Păţan



April 29, 2021

## What Are Run Targets & How To Run Code Anywhere

Previously, when you were using GoLand, you could test and run your code only on the same machine you had the l...



Florin Păţan